Pioneer Electronics

ELECTRONIC COMMUNICATIONS EQUIPMENT

738 Pacific St., San Luis Obispo, California, 93401, 805-543-0930

****A SPECIAL OFFER TO RTTY ENTHUSIASTS, ADVANCED & EXTRA CLASS AMATEURS, AND AMATEUR CLUBS****

Please accept the enclosed article on "Getting Started on RTTY" with our compliments.

Pioneer Electronics is offering a special holiday bargain on it's Pioneer 900 tunable teletype frequency shift converters, and the brand new Pioneer 300 frequency standards. If you order a Pioneer 900, 900C (commercial), or 900M (military) before January 31, 1969, you will receive free of charge the optional built-in loop power supply (normally $25). Those who order a Pioneer 300, 300R or 300K frequency standard will receive an extra resonator free (normally $35).

This is our way of getting acquainted with you, offering our congratulations for your accomplishment and contribution to amateur radio, and wishing you a happy holiday season.

Sincerely yours,

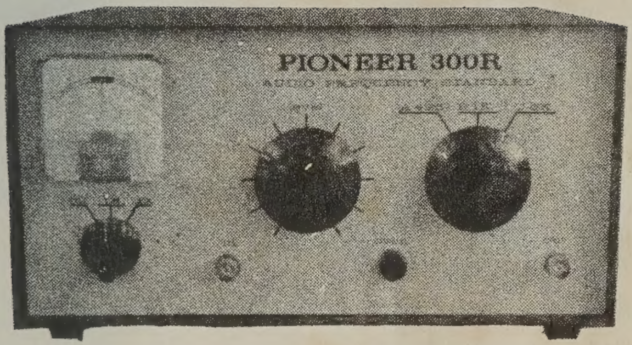
Gary Glassmeyer

Gary Glassmeyer, K6REU
General Manager

PIONEER 300

AUDIO FREQUENCY STANDARDS

(PRELIMINARY TECHNICAL BULLETIN)



PRICES

300R------$169.50

300------$139.50

300K------$99.50

FEATURES

*Stability .005%,(.5 hz @ 10Khz, .01 hz @ 200 hz).

*Switch selects up to three standard frequencies.

*Any choice of frequencies in the 1 Khz to 6 Khz range. (200 to 10,000 hz on special order).

*All solid state design.

*Quartz resonators for ultimate stability.

*Functions as tone receiver or tone transmitter.

*Built-in attenuator for receive applications.

*Oven maintains temperature within better than 1° F.

*Oven cycling indicator on front panel.

DESCRIPTION

The Pioneer 300R is a highly stable secondary frequency standard with all of the features mentioned above. It can be used in the receive mode for calibrating oscillators directly without the use of an oscilloscope or other indicating device normally needed with a standard to indicate zero beat. It is an indispensable piece of equipment for radioteletype work, and a valuable piece of equipment for calibrating oscillators, oscilloscopes, and bridges. Highly accurate inductance and capacitance measurements can be made using this precision source. The unit is solid state throughout with an integrated circuit in the output. Frequency control is maintained by a newly discovered piezoelectric transducer which gives unmatched stability. To guarantee stability over a wide range of temperatures, the resonators are kept at a nearly constant temperature in an insulated and shielded oven. The 300 is identical to the 300R with the exception that it has only transmitting capabilities. The 300K is a kit form 300 without the cabinet for those who want to do their own packaging. The oven comes as a sealed unit with desired resonators included inside. One resonator is supplied with every standard, additional standard frequencies can be had by requesting additional resonators at $35 each. Both the 300 and the 300R carry a one year guarantee on materials and workmanship.

SEND CHECK OR MONEY ORDER TO Pioneer Electronics, 738 Pacific Street, San Luis Obispo, California, 93401. Be sure to specify model number and frequencies desired. California residents add 5% sales tax.

Pioneer 900

features

- * Continuous tuning of shi
  from 100 to 900 HZ
- * All solid state design
- * Tuning lights
- * High voltage transistor
  driving printer magnet
- * 250 HZ selectivity
- * Built-in bandpass filter
- * No polar relays
- * Optional built-in 125 vo
  60 ma. loop supply ($25)
- * Full metering

prices

Amateur model $199.50

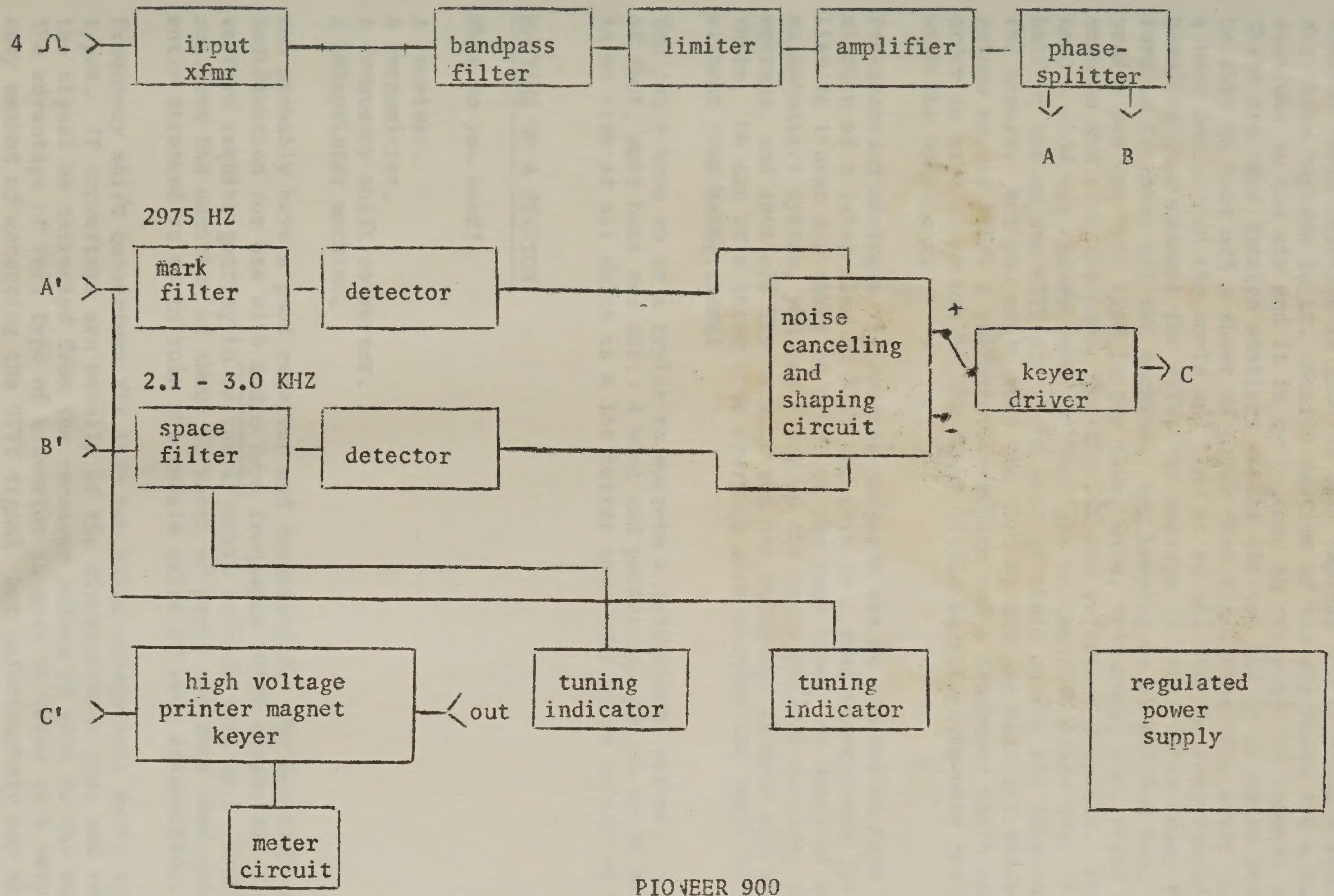
Commercial model $269.50

Military model $354.00

description

The Pioneer 900 is a tunable frequency shift converter. It will accommodate any shift from 100 to 900 HZ. The tuning is continuous and non-standard shifts are readily received. The unit is completely solid state with 20 semiconductors and one integrated circuit. Tuning lights on front panel give fast accurate indication when the signal is properly tuned in. Unlike most transistor converters, the Pioneer 900 utilizes a high voltage keyer stage which will switch up to 300 volts. This high voltage feature allows a full printing range to be obtained. The Pioneer 900 has a built-in bandpass filter, 250 HZ selectivity per channel, complete metering, and consumes less than 10 watts. The input impedance is 3.2 ohms (others on request). The converter is packaged in a 5 3/4" high, 11 3/4" wide, 8 3/4" deep perforated cabinet. Wired and tested unit is guaranteed for one year on materials and workmanship. Availability is four to six weeks.

PIONEER ELECTRONICS
738 Pacific Street
San Luis Obispo, Califo



PIONEER 900
Tunable Frequency Shift Converter

BLOCK DIAGRAM

GETTING STARTED ON RTTY

Amateur radio teletype is growing very rapidly and it holds a special facination for those engaged in it. Nearly anytime of the day there are a half-dozen stations on the air and it is quite easy to get ahold of someone for a QSO. There are many foreign stations on the air too and it is extra thrilling to be able to tear off a sheet of paper from the teleprinter after just working a rare one across the world and show it to the XYL and your friends. Traffic handling is a natural for RTTY, the message is received in ready to deliver form as it comes off the machine. Log keeping is simplified too. If you prefer you can just type in the time, date, frequency, etc. right on the machine and save the paper for the FCC and reference purposes. You can't keep a good rag chewer down and they are on the RTTY bands too. Probably half of the active RTTY'ers spend most of their on the air time shooting the breeze. But you can't read the mail by ear and hear all these facinating goings on, it takes a teleprinter machine and a frequency shift converter in order to make sense out of the funny little beepity-beep-beep that is heard with the naked ear.

Pre-recorded messages and routine messages can be punched on tape for transmission at a later time on RTTY and this is a real convenience for hams that like to tinker and carry on a QSO at the same time. By means of what is called an autostart system, you can start up the other fellows machine, send him a message, and shut off his machine and his equipment without him even being there. He can at a later time start up your machine and reply to your message without your being there!

You don't have to be a typist to operate a teleprinter either. And as a matter of fact, most hams are not. A hunt and pecker can get up to 35 words per minute in no time at all which is a lot better than most of us can do on CW.

SETTING UP A STATION

What do you need?

A receiver.
A transmitter.
A frequency shift converter.
A teleprinter machine.

You probably have a good receiver and transmitter. The receiver needs no modification for use with audio type frequency shift converters (some converters require getting in to the IF strip to hook them up.) Your transmitter requires the addition of about $3 worth of parts and they need not be permanently attached so as to ruin the resale value of your transmitter.

Frequency shift converters fit into two basic catagories; audio types and IF types. IF converters are usually of the discriminater type and require that the signal be extracted from the receiver before it gets to the audio section. The advantage of this type of converter is that it lends to a very simple and easy method of detecting the RTTY signal, but unfortunately any signal within the discriminater pass band (approx. 2000 hz) will trigger the machine, and we just don't have those wide open spaces on the bands anymore. The audio type converters simply plug into the audio output of your receiver and usually

utilize very narrow band widths (approx. 250 hz). Ultimately either type of converter must perform the task of converting the incoming signal into DC square-wave pulses which drive the printer magnets in the teleprinter and cause it to go whirling into action.

Getting ahold of a teleprinter is probably the most difficult part of getting started on RTTY, but we at PIONEER ELECTRONICS promise to each of our customers that we will take care of all of the red tape involved in getting a machine. There are several models around: Model 12's, 14's, 15's, 19's, 26's, 28's ranging in price from $50 to $1,500 for the Model 28. The 15's and 26's seem to be the most popular and can be had for around $85. The 26's are quiet intermittent duty machines. The 15's are rugged continuous duty machines. The 28's are still fairly young and are also rugged and rated for many years of continuous duty service. If you would like to look around for a bargin, the following amateurs may be able to tell you where to find a machine: W1AFN, W1OUG, W2ZKV, W2JAV, W3CRO, W3PYW, W4EHU, W4RWM, K5ARN, W5KXD, W6AEE, W6VPC, W7HRC, W7WWG, W8CAT, W8DLT, W9GRW, W9YQH, WONOY, WOATM, VE2ATC, VE3BAD. A subscription to RTTY journal would help in finding a machine too since most of the fellas on RTTY read and advertise in this magazine. The address is RTTY Journal, P. O. Box 837, Royal Oak, Michigan, 48068. Subscriptions run $3.00 a year.

Figure 1 shows how your equipment can be hooked up to a typical RTTY instalation. There can be many variations and additions to this basic setup but they all begin from here.

RECEIVERS

As was mentioned before, your receiver will need no modifications for use with an audio type converter. Our PIONEER 900 Converter is of this type and can be supplied to match any output impedance. Most receivers have a 4 ohm output impedance, others have 8, still others are 500, 600, etc. If some requirements were to be placed on a receiver for RTTY it would be best that it have good stability and have an audio response of up to 3000 hz, which includes the majority of receivers made.

TRANSMITTERS

In transmitting RTTY signals we use what is called frequency shift keying. Whenever the keyboard is punched the carrier frequency shifts. We conventionally build the frequency shifting circuits so that when the transmitter is keyed the frequency shifts downward, to a lower frequency. This is easy to remember if you recall LSMFT, Low Shift Means Fine Teletyping. The FCC allows amateurs to shift their carriers by a maximum of 900 hz which can include any shift from the theoretical lowest useable shift of 45.5 hz up to the full 900 cycles. Most hams attempt to come close to one of the "standard" shifts of 850 hz, 425 hz, and 170 hz, but this is not always accomplished and it is not unusual to find some stations off standard by 100 hz or so.

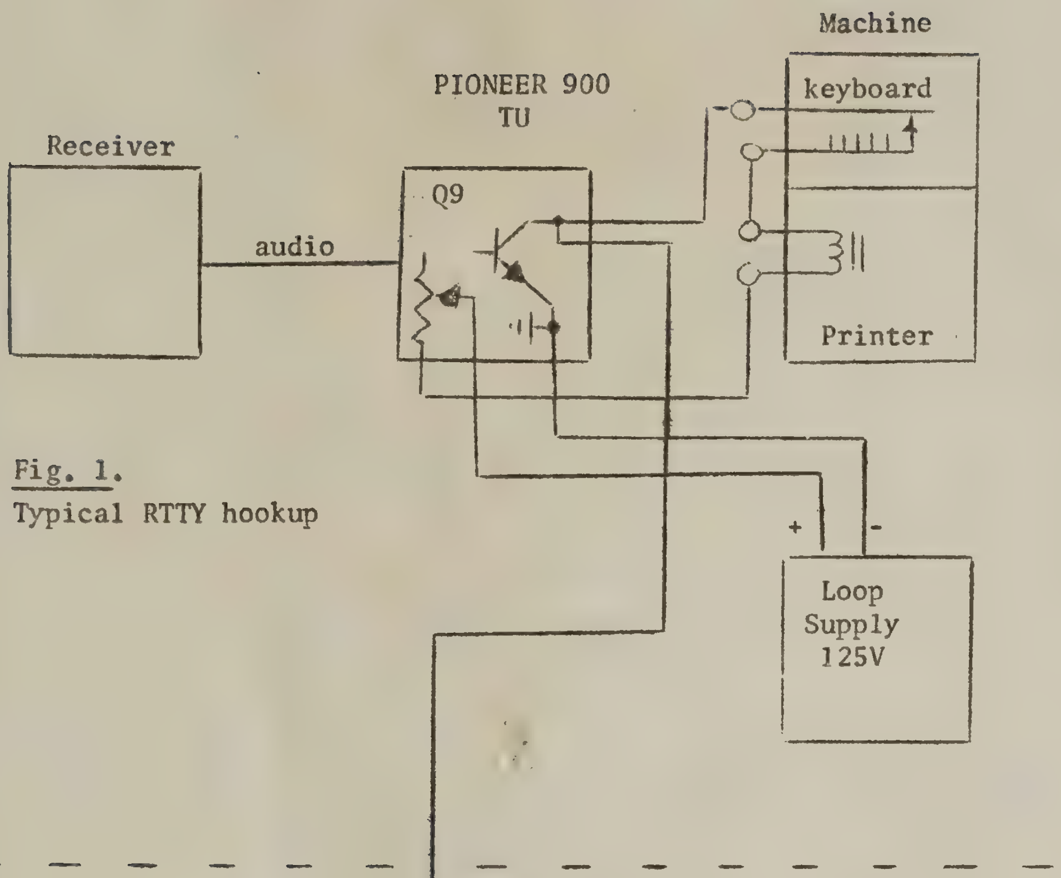


Fig. 1.
Typical RTTY hookup

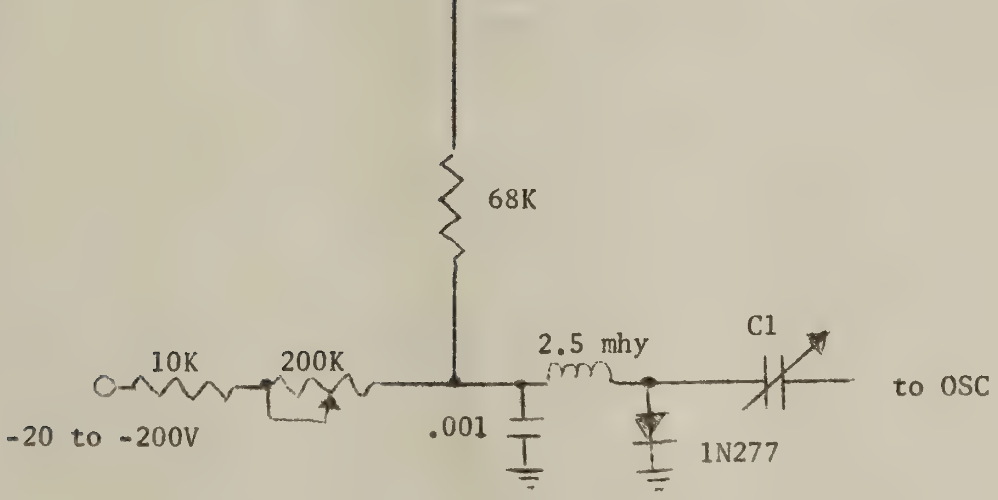


Fig. 2. Transmitter FSK Circuit

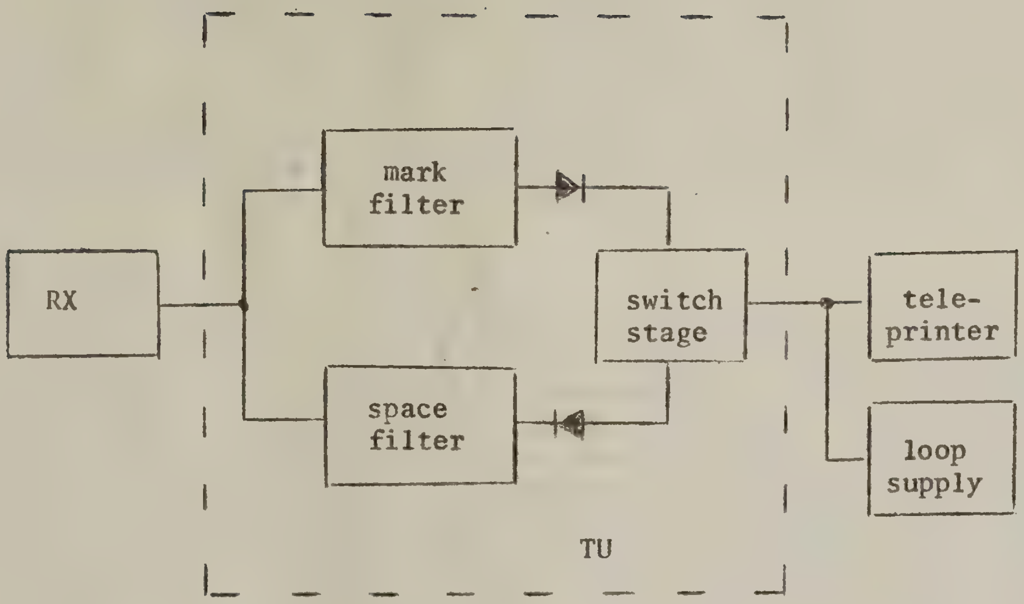


Fig. 3. Basic Terminal Unit

Figure 2 shows a typical circuit for obtaining a frequency shift from your transmitter oscillator. There can be many variations of this basic idea for each individual situation, but this basic circuit is quite popular and used by most amateurs. C1 is adjustable, its value determines the amount of frequency shift obtainable and varies from oscillator to oscillator, so it must be set to give the desired shift. Our circuit designer will be glad to furnish our customers with detailed information for converting any particular transmitter to FSK.

FREQUENCY SHIFT CONVERTERS

Frequency shift converters are commonly referred to as terminal units or just TU's among most hams. They are the heart of any RTTY station and must be able to do many things. The most basic TU simply converts the incoming signal to DC pulses which operate the teleprinter. But in order to copy more stations than just the guys down the block, many refinements are usually incorporated in the TU. They might include a limiter to hold the incoming signals at a fairly steady level, a bandpass filter to eliminate harmonic and other unwanted signals, and some sort of a tuning indicator such as a built-in oscilloscope, or a "magic eye" tube. These tuning devices are needed in order to get the signal accurately tuned in, which is nearly impossible to do with the human ear alone. RTTY tuning is much like SSB tuning in as much as it must be within100 hz for maximum performance.

HOW DO TU'S WORK?

An RTTY transmitter is just a CW transmitter, but instead of keying the carrier off and on with a key, we cause the carrier to shift in frequency when we punch the keyboard. So in effect we are transmitting two CW signals, when one is on the other one is off and vice versa. The signal that is on when we have our hands in our pockets is called the MARK signal. When we punch a letter on the keyboard we cause the transmitter to shift frequency very rapidly, thus generating signal LOWER in frequency called the SPACE signal. It is as important that you know these conventions as it was to know UP and DOWN, or you may find yourself transmitting what the RTTY'ers call "upside-down". So with that in mind lets see how the signal goes through the TU. (See Figure 3.) The receiver audio output will consist of two audio tones, the mark frequency will be the higher pitched tone and the space frequency will be the lower pitched tone. [Another RTTY convention says that the mark frequency is usually 2975 hz (2975 - 2125 = 850).] These tones pass through two seperate tuned circuits (one is tuned to 2975 hz, the other is tuned to 2125 hz) the outputs of these tuned circuits are rectified and applied to a keyer stage which acts as a switch turning the current which goes to the teleprinter on and off. When the switch is on and current is passing through the magnets in the teleprinter the machine is in the mark condition, when the current is not flowing the machine is in the space condition.

WHERE DO YOU GET A TU?

Some fellas build their own. From time to time there are circuits in RTTY magazine, and there is usually one in The Radio Amateurs Handbook. There are a few commercially available TU's ranging in price from $35 for a simple circuit board and components package to $1350 for high quality industrial

model complete with cabinet, cables, and a loop supply. But they are all either fixed tuned or of the discriminator type. The fixed tuned units will accommodate only one shift, for example 850 hz only. Discriminator TU's will receive either narrow shift or wide shift plus any other nearby signal whether it is RTTY, CW, AM, SSB, or noisy cars driving down the street. We are especially proud of the PIONEER 900 because it was designed to overcome all of the problems that have been plaguing RTTY over the years. It will copy any shift from 100 to 900 hz and yet it maintains maximum selectivity to guard against interference. This is accomplished by special tunable filters which have a band width of 250 hz which is just wide enough to reject any other type of signal trying to get through. No other TU has this feature which allows tuning of any shift, standard or off standard. Another exclusive feature of the PIONEER 900 is its tuning lights. Other TU's use expensive oscilloscope tuning indicators and tricky "magic eye" tubes to aid in tuning in an RTTY station. The PIONEER 900 uses two lamps which light up instantly when the station is properly tuned. The PIONEER 900 employs the most up to date solid state devices, to include 20 semiconductors and one integrated circuit for an estimated 15 to 20 years of trouble free service.

It takes at least 125 volts at 60 ma. to obtain maximum operating efficiency out of the teleprinter. Lower voltages will cause sluggish operation of the printer magnets and will greatly increase the number of errors printed on the machine. The PIONEER 900 is not the only solid state TU available but it is the only one that is capable of driving a full 125 volts to the printer magnets. Most other TU's put out about 25 volts which will just barely operate a machine which is in good operating condition. The rise time and fall time of the square wave going to the teleprinter magnets are also of great importance in giving maximum printing efficiency. If the waveform is not perfectly square a great number of errors will be printed on the machine. The PIONEER 900 uses a computer type integrated circuit to achieve this extremely fast rise and fall time. This particular integrated circuit also makes it nearly impossible for the PIONEER 900 to be triggered by noise - another tremendous difficulty which is experienced by RTTY'ers. Many of the solid state TU's available now still use very delicate and fussy devices called polar relays. These relays were rejected in the design of the PIONEER 900 in favor of driving the selector magnets directly with a special high power transistor. A large meter on the front panel of the PIONEER 900 reads the current going through the printer magnet of your particular machine, or it shows the mark space state of the machine which is used as an aid in tuning by some operators. All supply voltages are regulated in the PIONEER 900 and it is available with a built-in loop supply for powering the teleprinter although it is not a standard accessory because some machines come with a loop power supply.

There are three different models in the PIONEER 900 series, the amateur model, the commercial model, and the military model. The amateur model uses phenolic printed circuit boards, and meets less rigid electrical and mechanical specifications than the commercial and military models. The commercial model has 5% tolerance components and glass circuit boards, a built-in loop supply, and a special paint on the cabinet. The military model features hermetically sealed transformers and inductors, glass circuit boards, 5% components, a built-in loop supply, ruggedized construction, fungicide protection, and a special paint job. Custom mark and space frequencies within the 1 to 8 Khz range can be had on any model for an additional $25.

OPERATING AN RTTY STATION

Operating RTTY is much like any other mode. If we tune in a fella calling CQ and he is finished we just turn the carrier on and start pounding on the key board saying the same things we would say on FONE or CW; the paper on your machine will look something like this.

```
CQ CQ CQ DE W3XYZ W3XYZ W3XYZ AR K  CW ID FOLLOWS
W3XYZ W3XYZ W3XYZ DE K6REU K6REU K6REU AR K CW ID FOLLOWS
```

We tell the other fellow that we are going to identify on CW at the end of the transmission so that he will have time to shut off his machine. Otherwise it would clatter and print errors while the CW was being transmitted.

WELCOME

RTTY is probably the most facinating of modes, and there is no comparison to the feeling you have each time you set back and see your call being typed on the paper by that amazing machine.

Welcome to the world of the "green keys", the friendliest, most personable, and interesting group on the air.

73, Gary Glassmeyer

Gary G. Glassmeyer, K6REU
Pioneer Electronics
738 Pacific Street
San Luis Obispo, California 93401

Pioneer Electronics
738 Pacific Street
San Luis Obispo, Calif. 93401

[redacted]

jan.89
91360